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ANALYSIS OF MOST FREQUENTLY VIOLATED PROCEDURES ACCIDENTS

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PREFACE

The present report is part of a coordinated research initiative sponsored by the U.S. Army Safety Center. The research team examined the accident reports (DA Form 285-1) of 605 cases verified to be the result of human error. Based on the information included on DA Form 285-1, and a careful reading of the narrative, procedures that had been violated were identified. There were 138 violated procedures; these procedures were then classified by Accident Type, Activity Type, Case Factor, amd System Inadequacy. It was found that the twenty most frequently violated procedures accounted for approximately 60% of the accidents sampled.

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EXECUTIVE SUMMARY

Human error is consistently found to be the major cause of ground accidents. U.S. Army Safety Center (USASC) personnel had observed a small number of procedures were frequently violated, and that these violations caused a relatively large proportion of accidents. It is therefore critical to identify which violated task procedures are linked to human error accidents. A group of investigators from the University of Alabama were given the task of conducting an independent, objective, and systematic analysis of ground accidents involving human error in order to determine the most frequently violated procedures.

First, 882 accident reports were examined to screen for human error as a causal factor in the reported accident. It was found that human error was a causal factor in 605 (69%) of these cases. Using the USASC taxonomy for classifying the job or activity being performed the accidents were classified across the dimensions of: Accident Type, Activity Type, Accident Cause Factor, and System Inadequacy.

It was found that 138 procedures were violated resulting in 605 accidents. Futhermore, it was found that the 20 (14%) most frequently violated procedures resulted in 360 (60%) of the accidents. This information base provides a focus on where the most cost effective effort can be directd at developing actions to reduce accidents.

Introduction

Accidents in the U.S. Army vary widely across a number of dimensions. However, as is found to be the case in most organizations, about 80% of Army accidents are due to human error. This broad category, "human error," requires further analysis to specify further categories and thus pinpoint the most common types of error within certain tasks, jobs, or activities. A taxonomy constructed by the U.S. Army Safety Center provided the classification framework for this analysis.

It is necessary to determine the most frequently violated procedures and to examine characteristics of the accident which those violations have lead to. Information about accident frequency for each category can provide the basis for decisions about possible remediation. For example, based on the data, decisions about "acceptable" risk can be made. Certain types of accidents have low frequency and little associated cost and would therefore not be a prime target for remediation. Other accidents with high frequency and cost require countermeasures; accident reduction here will bring about the most beneficial cost-benefit ratio.

The present report provides an analysis of the most frequently violated procedures involved in Army ground accidents. The following conditions describe the sample:

1. The accident must have undergone an in-depth investigation and been recorded on DA Form 285-1.

2. The accidents involved on-duty personnel and the Army was accountable.

3. The accident occurred within the October 1985 - September 1987 time period.

4. The accidents were verified as being the result of human error.

Following an examination of 882 accident reports, 605 cases were found to meet the above criteria. The next step involved identification of the task, job, or activity being performed. Using the U.S. Army Safety Center taxonomy, the accident data was analyzed across the following relevant dimensions:

1. Accident type.
2. Activity type.
3. Accident cause factor.
4. System inadequacy.
5. Army manual/regulation.

Matrices were constructed across single and paired dimensions. For each dimension and paired dimension, the top ten entries were established for the accident data. Finally, important procedures or paired entries were traced to Army manuals/regulations. Other summaries and matrices of results are also presented.

GENERAL PROCEDURE

Verification

Army ground accidents in the period October 1985 - September 1987 totaled __,___. Of this total number 882 cases were chosen at random with the restriction that DA Form 285-1 information was available on cases chosen. For all accident reports where DA Form 285 information was available, case numbers and task errors were recorded. Accident accountability was then examined. If the report stated that the Army was held accountable then that case was referenced for further examination. If, on the other hand, the Army was not held accountable for the accident, e.g., off-duty POV accidents, that report would be recorded but not examined further. In cases where the Army was held accountable, the task errors were tabulated and the narratives read. If this information was sufficient to establish the involvement of human error in the accident, it was then so classified. However, if the information contained in the narrative was not sufficient to verify human error, additional information was read within the accident report.

Items most frequently examined were: environmental conditions, corrective action, hours of sleep, and hours of continuous duty. If the information was still not sufficient, or if the information was confusing to the investigator, the case was questioned. A review panel then judged all questioned cases

and decided whether or not human error was involved. Of the 882 total cases, human error was found in 608 cases with no human error (or off-duty accidents) involved in the remaining 274.

Recording of Data

The 605 cases involving human error were recorded on data sheets (see Appendix A). Information included on the data sheets was date of accident, log number, total cost and the social security number of those involved in the accident. If more than three people were involved in the same accident, then separate data sheets were used for each person. Accident type information was obtained from Item No. 42 of the accident report. "Primary" and "other" accident types were recorded. Activity type was determined for each person involved in the accident (Item No. 18). The task error was then determined for each person involved in the accident by examining the task error classification Item No. 30. If no task error was listed, then classification was based on an examination of the narrative. The system inadequacy was determined by examining the narrative, task error, and any other information contained in the report which was deemed pertinent. These system inadequacies were recorded for each individual involved in the accident. If the violated procedure was linked to a manual in the narrative, then the manual name and number were recorded on the data sheet. Codewords for each case were determined from this information.

Determination of Army Regulations

Cases which were identified as corresponding to a particular Army manual that was in the possession of the University of Alabama team were examined first. The narrative, task error, and type of vehicle were examined for each case. From this information the appropriate manual was determined and the relevant regulation specified which covered the task error. When possible, the most specific regulation pertaining to the task error was identified rather than the more general area of the manual. In cases in which the manuals were specifically cited in the narrative, the correctness of the citation was then verified and then recorded. Any case which contained human error and was not covered in an obvious way in a particular manual was questioned and put aside. In addition, any cases which were determined to be misclassified during our verification of the cites included in the accident report narratives were also questioned.

Cases traced to manuals that we did not have were identified using "The Common Quick Reference for Accident Reporting." This memorandum was supplied to us by the U.S. Army Safety Center and was used in the identification of most Dd 4145.9-R-1 cases and some OSHA 2206 cases. All cases where questions still existed were compiled and taken to Ft. Rucker where additional manuals were available. Consultation with U.S. Army Safety Center personnel resolved remaining questions concerning correct manuals and paragraphs.

METHOD

Description of Data Analysis

In the following report, a selected group of 605 accidents involving human error is described according to frequency for a group of 5 taxonomical configurations based on the USASC - classification of accidents and task errors as well as pertinent Army, D.O.D., OSHA and other regulations.

1. The Taxonomic Configurations.

The USASC classification of accidents falls into four groups. For the set of 605 accidents which are analyzed here, it is sufficient to recognize: group 1 (ACCIDENT TYPE; 10 FACTORS); group 2 (ACTIVITY TYPE; 27 FACTORS); group 3 (ACCIDENT CAUSE FACTOR; 15 FACTORS); group 4 (SYSTEM INADEQUACY; 25 FACTORS). Although the full lists of factors corresponding to different groups may be larger than those actually used, it should be noted that since only accidents involving human error are dealt with, there is no need to use full lists at all times.

In this study we are also interested in violations of various regulations which may have taken place. An analysis of the original reports produced a fifth group of factors, viz, group 5 (REGULATION; 14 FACTORS).

Along with Group 5 by itself, we also consider the pairings of Group 5 x Group 1, Group 5 x Group 2, Group 5 x Group 3, and Group 5 x Group 4. Each such grouping can be thought of as a taxonomic configuration. Although we are interested in only the

five taxonomic configurations quoted, it is obvious that one could proceed along the same lines as we have for other such taxonomic configurations as well.

For the pairings we have included a set of four matrices of dimensions 138 x 11, 138 x 28, 138 x 16, and 138 x 26, respectively. The last row and last column of these matrices lists totals, i.e., the last column lists row totals while the last row lists column totals for occurrences. Since some accidents have multiple listings, the number of occurrences usually exceeds the number 605. However, if we consider percentages of totals as the better listing, then there is no real difference between the selection of one statistic or another, especially when it comes to ordinal rankings.

For each of these four matrices we have also included a simpler set of tables which contains the following information. From a given matrix corresponding to group 5 x group, i = 1, 2, 3...4, select the 10 cells with the largest frequencies. Note that we are excluding the last row and last column (i.e., the totals) in performing this task. We then ordered those ten cells in rank order by assigning the number 10 to the largest entry, the number 9 to the next largest entry, all the way down to the number 1 for the smallest entry listed. If two cells are to be listed and have the same frequency, then the corresponding integer i is listed twice. Thus, the table may have more than ten entries.

The selection of the top ten entries rather than top 5 or top 20, or any other number, was arbitrary. Our criterion is that the number of cases is relatively small and that a preponderance of the total should be captured by these cells. In the current situation this criterion seems to be a good choice.

For the single Group 5 we have included a table of frequencies of violations per manual and a further analysis of some aspects of the table.

In summation, the user has available:

1. The data-base: This is essentially a 605 x 340 design-matrix which may be used to prepare other design-matrices needed in statistical studies on the accident sample represented by the data-base and classified using the accepted taxonomy.
2. A derived set of simple descriptive statistics in the form of 5 design (display) matrices and associated logs of accident cases. These data were derived using algebraic manipulations on the data base.
3. A second derived set of interpretative statistics in the form of 5 matrices which select the cells with the largest frequencies and both numerical entries as well as rank orders.
4. A final set of summary statistics based on the distributions of certain factors over the 5 matrices listed in paragraph 3.

Depending on special needs, the user would be able to make different uses of the information available at the different levels described in paragraphs 1, 2, 3 or 4 above.

REGULATIONS x ACCIDENT TYPES

Results and Discussion

In considering REGULATION x ACCIDENT TYPE, we are dealing with the Regulations violated (138 factors) and Accident Type (10 factors). The matrix displaying this information will therefore have 138 rows (representing the violated Regulation) and 10 columns (representing the Accident Type), plus marginal totals for rows, columns, and a grand total.

The number of data entries in the matrix may not equal the total number of accidents because in some accidents there were several individuals involved, all of whom contributed data entries to the same accident, and some accidents involving more than one Accident Type. For REGULATIONS x ACCIDENT TYPES there were 712 data entries in the matrix resulting from only 605 accidents.

Since we are dealing with 138 x 10 = 1380 cells in the matrix, the average number of data entries per cell is:

$$\frac{\text{Number of data entries}}{\text{Number of cells}} = \frac{712}{1380} = .50$$

This ratio value is provided to assist the judgement of whether the cell entry is "large" or "small". For example, the cell Regulation (CSP: Material Handling) x Accident Type (Personal Injury) is ranked 5th among the most frequently occurring paired factors with a frequency of 15. Note that the value 15 is 30 times the average frequency of data entries (.50) and is therefore a relatively large value in this context.

Another observation of interest is that FM 21-305, p. 7-7, paragraph 2: Speeding occurred in three of the top ten entries in the matrix, for example,

FM 21-305, p. 7-7, paragraph 2 x Army Motor Vehicle;
21 entries (ranked 4th)

FM 21-305, p. 7-7, paragraph 2 x Personal Injury;
18 entries (ranked 5th)

FM 21-305, p. 7-7, paragraph 2 x Privately Owned Vehicle (on duty);
9 entries (ranked 11th)

For a total of 48 entries.

If we are interested in the percentage of violations that "speeding" represents, we calculate 48/712 x 100 = 6.7% of the cases. If, on the other hand, one wishes to estimate the number of accidents these data entries represent, the percentage would me multiplied by the total number of accidents: 6.8% x 605 = 41 accidents correspond to the data entries in the three cells.

When the most frequently occurring paired factors are examined, several groupings of Regulations can be formed:

DOD 4145.9-R-1, paragraph 6-114(a), 115, and 113:

Accident Type (Personal Injury)	Frequency
Improper lifting	38
Loading	19
Non-powered material handling	10
	67 Total entries
	9.4% of total

CSP (Variety of types)

Accident Type (Personal Injury)	Frequency
Slipped/Tripped/Fell	31
Material handling	15
Vehicles	13
Violated orders/known safety practices	8
	67 Total entries
	9.4% of total

FM 21-305, page 7-7, paragraph 2; page 13.4, paragraph 1:

Accident Type	Frequency
Speeding (Army motor vehicle)	21
Speeding (Personal injury)	18
Driving in rain (Army motor vehicle)	9
Speeding (privately owned vehicle)	9
	57 Total entries
	8% of total

FM 57-220, page 2-6:

Accident Type (Personal Injury)	Frequency
Improper parachute landing/fall	10
	1.4% of total

Also included in this section are the following:

1. A matrix of REGULATION x ACCIDENT TYPE pairings (Table 1).
2. A distribution of the most frequently occurring paired factors (Table 2).

TABLE 1

Accident frequency listed by Manual and Accident Type

	PERSONAL INJ.	ARMY MOTOR VE.	ARMY CO. VE.	OTHER ARMY VE.	POV	EXPLOSIVES	FIRE	PROPERTY DAM.	MARINE NOT UND.	CHEMICAL	TOTAL	
1.	18	21	0	1	9	0	0	2	0	0	51	SPEEDING
2.	4	2	0	1	2	0	0	0	0	0	9	FASTEN SEAT BELTS
3.	0	7	1	0	4	0	0	0	0	0	12	FOLLOWING DISTANCE
4.	4	7	0	0	2	1	0	0	0	0	14	RESTING
5.	1	1	0	0	0	0	0	0	0	0	2	PASSENGERS SEATED
6.	1	1	0	0	0	0	0	0	0	0	2	STARTING PROCEDURES
7.	4	4	0	0	1	0	0	0	0	0	9	SAFE OP., ATTITUDE
8.	2	9	0	0	5	0	0	0	0	0	16	DRIVING IN RAIN
9.	2	2	0	0	0	0	0	0	0	0	4	ALCOHOL USE
10.	3	2	0	0	1	0	0	0	0	0	6	ALCOHOL USE
11.	2	6	0	0	2	0	0	0	0	0	10	TRY TO ANTICIPATE
12.	2	1	0	0	0	0	0	0	0	0	3	BEING A PEDESTRIAN
13.	4	2	0	0	4	0	0	0	0	0	10	SAFE AND UNSAFE PASSING
14.	3	4	0	0	0	0	0	1	0	0	8	HANDLING CURVES
15.	3	3	0	0	0	0	0	0	0	0	6	AUTHORIZATION
16.	4	4	0	0	0	0	0	0	0	0	8	IDENTIFICATION CARD
17.	3	3	0	0	2	0	0	0	0	0	8	FATIGUE
18.	0	1	0	1	0	0	1	0	0	0	3	TURN OFF ENGINE
19.	1	1	0	0	1	0	0	1	0	0	4	DRIVING ON THE RIGHT
20.	0	0	0	1	0	0	0	1	0	0	2	HANDLING CARGO
21.	2	7	1	1	3	0	0	2	0	0	16	SELECTIVE VISION
22.	0	1	0	0	0	0	0	1	0	0	2	PARKING AT NIGHT
23.	1	1	0	0	0	0	0	0	0	0	2	USE A TOW BAR
24.	2	3	2	0	0	0	0	1	0	0	8	OP. IN BLACKOUT COND.
25.	2	5	0	0	0	0	0	1	0	0	8	GROUND GUIDES
26.	1	1	0	0	0	0	0	0	0	0	2	PEDESTRIANS
27.	1	1	0	0	0	0	0	0	0	0	2	BLOWOUTS
28.	3	5	0	0	2	0	2	1	0	0	13	INSPECTIONS
29.	1	1	0	0	1	0	0	0	0	0	3	LIGHTS
30.	1	0	0	1	0	0	0	0	0	0	2	AVOIDING COLLISIONS
31.	0	2	1	0	0	0	0	0	0	0	3	DRIVER PRAC/HAND POSITION
32.	0	2	0	0	0	0	0	1	0	0	3	U-TURNS
33.	0	2	0	0	0	0	0	1	0	0	3	BRAKING AND STOPPING
34.	0	1	0	0	0	0	0	1	0	0	2	PREVENTIVE MAINT.
35.	3	3	0	0	2	0	0	0	0	0	8	NIGHT DRIVING, RED. VISION

	PERSONAL INJ.	ARMY MOTOR VE.	ARMY CO. VE.	OTHER ARMY VE.	POV	EXPLOSIVES	FIRE	PROPERTY DAM.	MARINE NOT UND.	CHEMICAL	TOTAL	
36.	5	4	0	1	0	0	0	0	0	0	10	ANT. & WATCH PEDESTRIANS
37.	3	5	0	0	0	0	0	0	0	0	8	RUNNING OFF PAVEMENT
38.	1	2	0	0	0	0	0	0	0	0	3	ANIMALS
39.	1	1	0	0	0	0	0	0	0	0	2	LOWER YOUR BEAMS
40.	1	3	0	0	3	0	0	0	0	0	7	INTERSEC. W/TRAFFIC CONT.
41.	1	1	0	0	0	0	0	0	0	0	2	DURING OP. PROCEDURE
42.	0	1	0	0	0	0	0	0	0	0	1	DRIVER RESPONSIBILITIES
43.	1	1	0	0	0	0	0	0	0	0	2	STARTING/CHECK THE GEARS
44.	2	2	0	1	0	0	0	1	0	0	6	BACKING
45.	1	1	0	0	1	0	0	0	0	0	3	SAFE SPEEDS AT NIGHT
46.	0	2	0	0	0	0	0	2	0	0	4	TURN OFF ENGINE, SET BRAKE
47.	0	0	0	1	0	0	0	1	0	0	2	SAFE PASSING DISTANCE
48.	4	4	0	0	3	0	0	0	0	0	11	INTERSEC. w/o TRAFFIC CON.
49.	0	1	0	0	0	0	0	1	0	0	2	TURNING ON WET ROAD
50.	2	2	0	0	2	0	0	1	0	0	7	SIGNALING
51.	1	2	0	0	2	0	0	0	0	0	5	BEING PASSED
52.	0	1	0	0	0	0	0	0	0	0	1	OVERHEAD VEHICLE CLEARANCE
53.	1	1	0	0	0	0	0	0	0	0	2	OP. SPECIAL PURPOSE VEH.
54.	1	1	0	0	0	0	0	0	0	0	2	QUALIFICATION RECORD
55.	1	0	0	1	1	0	0	0	0	0	3	CHECK TRAFFIC CONDITIONS
56.	1	1	0	0	0	0	0	0	0	0	2	PASSENGER LIMIT
57.	0	0	0	1	0	0	0	0	0	0	1	JACKNIFING
58.	2	2	0	0	0	0	0	0	0	0	4	SECONDARY ROADS
59.	0	1	0	0	0	0	0	0	0	0	1	COUP. TRACTOR & SEMI
60.	2	4	0	0	0	0	0	0	0	0	6	SNOW AND ICE
61.	1	1	0	0	0	0	0	0	0	0	2	ROAD CONFIGURATION
62.	0	4	0	0	4	0	0	0	0	0	8	BEFORE TURN/CHANGE LANES, LOOK
63.	1	1	0	0	1	0	0	0	0	0	3	IMPROPER BACKING
64.	0	1	0	0	1	0	0	0	0	0	2	LOOK BEFORE CHANGING LANES
65.	1	1	0	0	1	0	0	0	0	0	3	TRAFFIC LINES
66.	1	1	0	0	0	0	0	1	0	0	3	SHIFITING GEARS
67.	0	1	0	0	0	0	0	1	0	0	2	TURNING
68.	0	1	0	0	1	0	0	0	0	0	2	TRAFFIC SIGNALS
69.	0	1	0	0	1	0	0	0	0	0	2	INTERSEC. W/TRAFFIC CONTROLS
70.	0	1	0	0	0	0	0	0	0	0	1	FOG

	PERSONAL INJ.	ARMY MOTOR VE.	ARMY CO. VE.	OTHER ARMY VE.	POV	EXPLOSIVES	FIRE	PROPERTY DAM.	MARINE NOT UND.	CHEMICAL	TOTAL	
71.	8	0	3	0	0	0	0	0	0	1	12	S.O.P.
72.	8	1	2	0	0	0	1	2	2	0	16	CSP: VIO. ORDERS/KNOWN PRAC.
73.	13	6	2	3	0	0	0	5	1	0	30	CSP: VEHICLES
74.	31	0	0	0	0	0	0	0	0	0	31	CSP: SLIPPED, TRIPPED, FELL
75.	15	0	1	0	0	0	1	3	0	0	20	CSP: MATERIAL HANDLING
76.	4	0	4	0	0	0	0	0	0	0	8	GROUND GUIDES (FM 21-306)
77.	2	0	2	0	0	0	0	0	0	0	4	INTERCOM SYSTEM (FM 21-306)
78.	0	0	1	0	0	0	0	1	0	0	2	USING A GUIDES (FM 21-306)
79.	0	0	1	0	0	0	0	1	0	0	2	DRIVING JUDGEMENT (FM 21-306)
80.	1	0	1	0	0	0	0	0	0	0	2	RIDER OUT OF VEH. (FM 21-306)
81.	1	0	1	0	0	0	0	0	0	0	2	STRIKING A TREE (FM 21-306)
82.	1	0	1	0	0	0	0	0	0	0	2	BLACKOUT MARKERS (FM 21-306)
83.	1	0	0	0	0	0	0	0	0	0	1	HANDLING A SHOTGUN
84.	1	0	0	0	0	0	0	0	0	0	1	TILE NEEDED REPAIRING
85.	5	5	0	0	0	0	0	0	0	0	10	VEHICLE LICENSING
86.	1	0	0	0	0	0	0	0	0	0	1	LINE POSITION WHEN JUMPING
87.	0	0	1	0	0	0	0	1	0	0	2	PARKING BRAKE
88.	0	1	0	0	0	0	1	0	0	0	2	REFUELING M54A2 TRUCK
89.	2	0	0	0	0	0	1	1	0	0	4	LICENSE TO OP. HEAT/COOL EQU.
90.	2	0	0	0	0	0	0	0	0	0	2	EARPLUG USE
91.	0	0	0	0	0	0	2	2	0	0	4	FUEL LEAK FROM STOVE
92.	1	0	0	0	0	0	0	0	0	0	1	STAIRS
93.	3	0	0	0	0	0	0	0	0	0	3	JUMPING FROM VEH.
94.	0	0	0	0	0	0	0	1	0	0	1	GEN. RULES FOR MAINT.
95.	1	0	0	0	0	0	0	0	0	0	1	CLEANING & HAND. RIFLE
96.	10	0	0	0	0	0	0	0	0	0	10	PROPER PLF
97.	1	0	0	0	0	0	0	0	0	0	1	EXERCISING AUTHOR.
98.	1	0	0	0	0	1	0	0	0	0	2	HANDLING DUD SIMULATORS
99.	2	0	0	0	0	1	0	0	0	0	3	HANDLING DUD SIMULATORS
100.	1	0	0	0	0	0	0	0	0	0	1	OPERATIONAL TEST BEFORE FIRING
101.	1	0	0	0	0	0	0	0	0	0	1	QUAL. FOR ASSIGNED WEAPON
102.	2	0	0	0	0	0	0	0	0	0	2	PLAYING SOFTBALL
103.	1	1	0	0	0	0	0	0	0	0	2	SECURE CARGO
104.	1	0	0	0	0	0	0	0	0	0	1	ANT. OTHER JUMPER
105.	0	1	0	1	0	0	0	0	0	0	2	ESCORT TOO FAR IN FRONT

	PERSONAL INJ.	ARMY MOTOR VE.	ARMY CO. VE.	OTHER ARMY VE.	POV	EXPLOSIVES	FIRE	PROPERTY DAM.	MARINE NOT UND.	CHEMICAL	TOTAL	
106.	1	1	0	0	0	0	0	0	0	0	2	DRIVER TRAINING
107.	1	0	1	0	0	0	0	0	0	0	2	TURRET POWER OFF
108.	0	0	0	0	0	0	0	0	0	0	0	PLACEMENT DURING FIRING
109.	1	0	1	0	1	0	0	0	0	0	3	PROC. WHEN VEH. DEV. TROUBLE
110.	1	0	0	0	0	0	0	0	0	0	1	TIME SINCE LAST JUMP
111.	1	0	0	0	0	0	0	0	0	0	1	INCORRECT ALT. SETTING
112.	1	0	0	0	0	0	0	0	0	0	1	INCORRECT ALT. SETTING
113.	1	0	0	0	0	0	0	0	0	0	1	ELECTROCUTED B/C MISS CLEARANCE
114.	1	1	0	0	0	0	0	0	0	0	2	ROCKET LEAK
115.	1	0	0	0	0	0	0	0	0	0	1	PARACHUTE MALFCT.
116.	1	0	1	0	0	0	0	0	0	0	2	CONVOYING (FM 21-306)
117.	2	0	0	0	0	0	0	0	0	0	2	DRY FLOORS
118.	0	0	1	0	0	0	0	0	0	0	1	DRIVING AT NIGHT (FM 21-306)
119.	0	0	1	0	0	0	0	0	0	0	1	HEAT STROKE
120.	1	0	0	0	0	0	0	0	0	0	1	PRECAUTIONS REG. HEAT
121.	1	0	0	0	0	0	0	0	0	0	1	VARIED TERRAIN (FM 21-306)
122.	1	0	1	0	0	0	0	0	0	0	2	LANDING WHEEL LOCKED IN PLACE
123.	1	0	0	0	0	0	0	0	0	0	1	ADV. DRIVER TR. (FM 21-306)
124.	1	0	1	0	0	0	0	0	0	0	2	PROPER LIFTING
125.	38	0	0	0	0	0	0	0	0	0	38	NON-POWERED MAT. HANDLING
126.	10	0	0	0	0	1	0	0	0	0	11	LOADING
127.	19	0	1	0	0	0	0	0	0	0	20	LADDERS
128.	3	0	0	0	0	0	0	0	0	0	3	GOOD HOUSEKEEPING
129.	5	0	0	0	0	0	0	0	0	0	5	POWERED MAT. HANDLING
130.	6	0	0	2	0	0	0	0	0	0	8	STAIRWAYS
131.	1	0	0	0	0	0	0	0	0	0	1	COMBAT DRIVING (FM21-306)
132.	7	1	0	3	0	0	0	0	0	0	11	FORKLIFT SAFETY RULES
133.	0	0	0	0	0	0	1	1	0	0	2	FLAMMABLE MAT. STORAGE
134.	1	0	0	0	0	0	0	0	0	0	1	ACCLIMATIZATION
135.	1	0	0	0	0	0	0	0	0	0	1	WATER DURING EXERCISE
136.	1	1	0	0	0	0	0	0	0	0	2	SAFE LOCATION OF PERSONS
137.	1	1	0	0	0	0	0	0	0	0	2	RIGGING B/TW VEH.
138.	1	1	0	0	0	0	0	0	0	0	2	TOWING WHEELED VEH.
	345	193	33	20	63	4	10	40	3	1	712	TOTAL

TABLE 2

DISTRIBUTIONS OF THE MOST SIGNIFICANT PAIRED FACTORS

FACTORS: REGULATION X ACCIDENT TYPE	FREQUENCY
DOD 4145, 9-R-1, para 6-114 (a): Proper lifting, personal injury	38
CSP: slipped/tripped/fell, personal injury	31
DOD 4145, 9-R-1, para 6-115: Loading, personal injury	19
FM 21-305, p. 7-7 para 2: Speeding, army motor vehicle	21
FM 21-305 p. 7-7 para 2: Speeding, personal injury	10
CSP: material handling, personal injury	15
CSP: vehicles, personal injury	13
DOD 4145, 9-R-1, para 6-113 (a): Non-powered material handling, personal injury	10
FM 57-220 p. 2-6: Proper parachute landing fall, personal injury	10
FM 21-305 p. 13-4 para 1: Driving in rain, army motor vehicle	9
FM 21-305 p. 7-7 para 2: Speeding privately owned vehicle	9
Standard operating procedure (SOP), personal injury	8
CSP: violated orders/known safety practices, personal injury	8
TOTAL:	209
TOTAL OCCURENCES	712
% TOTAL	29.4%
AVERAGE POPULATION PER CELL:	.50

REGULATIONS x ACTIVITY TYPES

Results and Discussion

Introductory comments from the preceding section are applicable to this section, except that we are dealing with Regulations Violated (141 factors) and Activity Type (27 factors). The matrix displaying this information will therefore have 138 rows (representing the Regulation violated) and 27 columns (representing the Activity Type), plus marginal totals for rows, columns, and a grand total.

When the most frequently occurring paired factors are examined, several groupings of Regulations can be formed.

DOD 4145 9-R-1, paragraph 6-113 (a), 114 (a), and 115:

Activity Type (Handling Material/Passengers	Frequency
Improper lifting	34
Loading	18
Non-Powered material handling	5
	57 Total entries
	11% of total

Common Safety Practices (Variety of types)

Activity Type	Frequency
Human locomotion	11
Supervising	5
Handling material/passengers	5

Maintenance/repair/service	5
	26 Total entries
	5% of total

FM 21-305 p. 7-7 para 2, p. 9-1 para 2 sent 1, p. 8-3 para 1 sent 4, p. 13-4 para 1, p. 2-2 para 4, p. 14-2 para 6 sent 1&3:

Activity Type (Operating veh/ves/animal)	Frequency
Speeding	17
Following distance	8
Selective vision	8
Driving in rain	7
Inspections	6
Running off pavement	5
	51 Total entries
	10% of total

FM 57-220 p. 2-6:

Activity Type (Combat Soldiering)	Frequency
Improper parachute landing/fall	10 Total entries
	2% of total

In comparing Activity Type with Accident Type, notice that we are dealing with the same violated regulations. When percentage of totals for the two classification groups are compared on the four major violated procedures considerable stability is observed.

Violated Procedure	Accident Type	Activity Type	Increase/ Decrease
DOD	9.4%	11%	+
CSP	9.4%	5%	-
FM 21-305	8 %	10%	+
FM 57-220	1.4%	2%	+

Notice that the CSP accidents, when decomposed according to Activity Type, tend to scatter much more than the others, reflecting that CSP violations are not as closely "typed" as the other violations/regulations. For the other violations/ regulations there is considerable stability, FM 57-200 shows no change in frequency, the slight percentage chance is due to the change in total data entries for the two matricies. For DOD and FM 21-305, there is a slight shift due to a mixture of small effects.

Also included in the section are the following:

1. A matrix of REGULATION x ACTIVITY TYPE pairings (Table 3).
2. A distribution of the most frequently occurring paired factors (Table 4).

TABLE 3

Accident frequency listed by Manual and Activity Type

	OP/VE/VES/ANI	MAINT/REP/SERV	HAND MAT/PASS	HUMAN LOCOMO	COMBAT SOLDIER	BEING A PASS	FOOD/DRK PREP	PHYS TRAINING	SPORTS	WEAPONS HAND/OP	HAND VEH/VES/ANI	SUPERV	JANITOR/HOUSE KEEP	SOLDIERING	ENGINEERING/CONST	OFFICE	SECUR/LAW ENF	PATIENT CARE	PERS HYG/FOOD & DRK	HORSEPLAY	FABRICATION	COMMUNICATION	FIRE DEPT.	BYST/SPEC.	LAUNDARY/DRY CL.	EDUCATIONAL	TEST/STUDY/EXP.	TOTAL	
1.	17	0	0	0	0	5	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	30	SPEEDING
2.	5	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	FASTEN SEAT BELTS
3.	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	FOLLOWING DISTANCE
4.	5	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	RESTING
5.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	PASSENGERS SEATED
6.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	STARTING PROCEDURES
7.	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	SAFE OP., ATTITUDE
8.	7	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	10	DRIVING IN RAIN
9.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ALCOHOL USE
10.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	ALCOHOL USE
11.	2	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	TRY TO ANTICIPATE
12.	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	BEING A PEDESTRIAN
13.	3	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	SAFE AND UNSAFE PASSING
14.	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6	HANDLING CURVES
15.	2	0	0	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	AUTHORIZATION
16.	3	1	0	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	IDENTIFICATION CARD
17.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	FATIGUE
18.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURN OFF ENGINE
19.	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	DRIVING ON THE RIGHT
20.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	HANDLING CARGO
21.	8	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	SELECTIVE VISION
22.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PARKING AT NIGHT
23.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	USE A TOW BAR
24.	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	OP. IN BLACKOUT COND.
25.	4	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	GROUND GUIDES
26.	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	PEDESTRIANS
27.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	BLOWOUTS
28.	6	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	INSPECTIONS
29.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	LIGHTS
30.	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	AVOIDING COLLISIONS
31.	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	DRIVER PRAC/HAND POSITION
32.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	U-TURNS
33.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	BRAKING AND STOPPING
34.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PREVENTIVE MAINT.
35.	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	NIGHT DRIVING, RED. VISION

	OP/VE/VES/ANI	MAINT/REP/SERV	HAND MAT/PASS	HUMAN LOCOMO	COMBAT SOLDIER	BEING A PASS	FOOD/DRK PREP	PHYS TRAINING	SPORTS	WEAPONS HAND/OP	HAND VEH/VES/ANI	SUPERV	JANITOR/HOUSE KEEP	SOLDIERING	ENGINEERING/CONST	OFFICE	SECUR/LAW ENF	PATIENT CARE	PERS HYG/FOOD & DRK	HORSEPLAY	FABRICATION	COMMUNICATION	FIRE DEPT.	BYST/SPEC.	LAUNDARY/DRY CL	EDUCATIONAL	TEST/STUDY/EXP.	TOTAL	
36.	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	ANT. & WATCH PEDESTRIANS
37.	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	RUNNING OFF PAVEMENT
38.	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	ANIMALS
39.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	LOWER YOUR BEAMS
40.	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	INTERSEC. W/TRAFFIC CONT.
41.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	DURING OP. PROCEDURE
42.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVER RESPONSIBILITIES
43.	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	STARTING/CHECK THE GEARS
44.	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	BACKING
45.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	SAFE SPEEDS AT NIGHT
46.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	TURN OFF ENGINE, SET BRAKE
47.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	SAFE PASSING DISTANCE
48.	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	INTERSEC. w/o TRAFFIC CON.
49.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURNING ON WET ROAD
50.	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	SIGNALING
51.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	BEING PASSED
52.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	OVERHEAD VEHICLE CLEARANCE
53.	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	OP. SPECIAL PURPOSE VEH.
54.	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	QUALIFICATION RECORD
55.	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	CHECK TRAFFIC CONDITIONS
56.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PASSENGER LIMIT
57.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	JACKNIFING
58.	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	SECONDARY ROADS
59.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	COUP. TRACTOR & SEMI
60.	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	SNOW AND ICE
61.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	ROAD CONFIGURATION
62.	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	BEFORE TURN/CHANGE LANES, LOOK
63.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	IMPROPER BACKING
64.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	LOOK BEFORE CHANGING LANES
65.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	TRAFFIC LINES
66.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	SHIFITING GEARS
67.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURNING
68.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TRAFFIC SIGNALS
69.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	INTERSEC. W/TRAFFIC CONTROLS
70.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	FOG

	OP/VE/VES/ANI	MAINT/REP/SERV	HAND MAT/PASS	HUMAN LOCOMO	COMBAT SOLDIER	BEING A PASS	FOOD/DRK PREP	PHYS TRAINING	SPORTS	WEAPONS HAND/OP	HAND VEH/VES/ANI	SUPERV	JANITOR/HOUSE KEEP	SOLDIERING	ENGINEERING/CONST	OFFICE	SECUR/LAW ENF	PATIENT CARE	PERS HYG/FOOD & DRK	HORSEPLAY	FABRICATION	COMMUNICATION	FIRE DEPT.	BYST/SPEC.	LAUNDARY/DRY CL.	EDUCATIONAL	TEST/STUDY/EXP.	TOTAL	
71.	0	0	0	1	0	1	0	0	0	3	0	2	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	11	S.O.P.
72.	0	0	0	0	4	2	0	1	0	0	0	3	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	14	CSP: VIO. ORDERS/KNOWN PRAC.
73.	6	1	1	0	2	3	0	0	0	0	3	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	22	CSP: VEHICLES
74.	0	3	5	11	3	1	0	3	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	30	CSP: SLIPPED, TRIPPED, FELL
75.	0	5	4	0	3	1	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	18	CSP: MATERIAL HANDLING
76.	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	6	GROUND GUIDES (FM 21-306)
77.	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	INTERCOM SYSTEM (FM 21-306)
78.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	USING A GUIDES (FM 21-306)
79.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVING JUDGEMENT (FM 21-306)
80.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	RIDER OUT OF VEH. (FM 21-306)
81.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	STRIKING A TREE (FM 21-306)
82.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	BLACKOUT MARKERS (FM 21-306)
83.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	HANDLING A SHOTGUN
84.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TILE NEEDED REPAIRING
85.	3	1	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	VEHICLE LICENSING
86.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	LINE POSITION WHEN JUMPING
87.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PARKING BRAKE
88.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	REFUELING M54A2 TRUCK
89.	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	LICENSE TO OP. HEAT/COOL EQU.
90.	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	EARPLUG USE
91.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	FUEL LEAK FROM STOVE
92.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	STAIRS
93.	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	JUMPING FROM VEH.
94.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	GEN. RULES FOR MAINT.
95.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	CLEANING & HAND. RIFLE
96.	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	PROPER PLF
97.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	EXERCISING AUTHOR.
98.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	HANDLING DUD SIMULATORS
99.	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	HANDLING DUD SIMULATORS
100.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	OPERATIONAL TEST BEFORE FIRING
101.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	QUAL. FOR ASSIGNED WEAPON
102.	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	PLAYING SOFTBALL
103.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	SECURE CARGO
104.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ANT. OTHER JUMPER
105.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ESCORT TOO FAR IN FRONT

	OP/VE/VES/ANI	MAINT/REP/SERV	HAND MAT/PASS	HUMAN LOCOMO	COMBAT SOLDIER	BEING A PASS	FOOD/DRK PREP	PHYS TRAINING	SPORTS	WEAPONS HAND/OP	HAND VEH/VES/ANI	SUPERV	JANITOR/HOUSE KEEP	SOLDIERING	ENGINEERING/CONST	OFFICE	SECUR/LAW ENF	PATIENT CARE	PERS HYG/FOOD & DRK	HORSEPLAY	FABRICATION	COMMUNICATION	FIRE DEPT.	BYST/SPEC.	LAUNDARY/DRY CL	EDUCATIONAL	TEST/STUDY/EXP.	TOTAL	
106.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVER TRAINING
107.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURRET POWER OFF
108.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PLACEMENT DURING FIRING
109.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PROC. WHEN VEH. DEV. TROUBLE
110.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	TIME SINCE LAST JUMP
111.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	INCORRECT ALT. SETTING
112.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	INCORRECT ALT. SETTING
113.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	ELECTROCUTED B/C MISS CLEARANCE
114.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ROCKET LEAK
115.	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PARACHUTE MALFCT.
116.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	CONVOYING (FM 21-306)
117.	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	DRY FLOORS
118.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVING AT NIGHT (FM 21-306)
119.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	HEAT STROKE
120.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PRECAUTIONS REG. HEAT
121.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	VARIED TERRAIN (FM 21-306)
122.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	LANDING WHEEL LOCKED IN PLACE
123.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ADV. DRIVER TR. (FM 21-306)
124.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	PROPER LIFTING
125.	1	2	34	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	NON-POWERED MAT. HANDLING
126.	1	2	5	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	10	LOADING
127.	0	0	18	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	LADDERS
128.	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	GOOD HOUSEKEEPING
129.	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	POWERED MAT. HANDLING
130.	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	STAIRWAYS
131.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	COMBAT DRIVING (FM21-306)
132.	2	1	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	8		FORKLIFT SAFETY RULES
133.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	FLAMMABLE MAT. STORAGE
134.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ACCLIMATIZATION
135.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	WATER DURING EXERCISE
136.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SAFE LOCATION OF PERSONS
137.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	RIGGING B/TW VEH.
138.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TOWING WHEELED VEH.
	176	29	78	24	28	55	1	6	4	15	36	42	4	4	2	0	0	0	7	1	1	1	0	4	0	0	1	519	TOTAL

TABLE 4

DISTRIBUTIONS OF THE MOST SIGNIFICANT PAIRED FACTORS

FACTORS: REGULATION X ACTIVITY TYPE	FREQUENCY
DOD 4145, 9-R-1, para 6-114 (a): Proper Lifting, handling material/ passengers	34
DOD 4145, 9-R-1, para 6-115: Loading, (a): handling material/passengers	18
FM 21-305, p. 7-7 para 2: Speeding, operating veh/ves/ani	17
CSP: tripped/slipped/fell, human locomotion	11
FM 57-220 p. 2-6: Proper parachute landing fall, combat soldiering	10
FM 21-305 p. 9-1 para 1,2: Following distance, operating veh/ves/ani	8
FM 21-305 p. 8-3 para 1: Selective vision, operating veh/ves/ani	8
FM 21-305 p. 13-4 para 1: Driving in rain, operating veh/ves/ani	7
FM 21-305 p. 2-2 para 3: Inspections, operating veh/ves/ani	6
FM 21-305 p. 14-2 para 6: Running off the pavement, operating veh/ves/ani	5
CSP: vehicles, supervisory	5
CSP: slipped/tripped/fell, handling material/passangers	5
CSP: material handling, maint/repair /service	5
DOD 4145, 9-R-1, para 6-113 (a): Non-powered material handling, handling material/passengers	5
TOTAL:	144
TOTAL OCCURENCES	569
% TOTAL	27.7%
AVERAGE POPULATION PER CELL:	.14

REGULATION x TASK ERRORS

Results and Discussion

Introductory comments from the preceding section are applicable to this section, except that we are dealing with Regulations Violated (138 factors) and Task Errors (27 factors). The matrix displaying this information will therefore contain 138 rows (representing the Regulation violated) and 27 columns (representing the Task Error), plus marginal totals for row, columns, and a grand total.

In the most significant paired factors section, several grouping of Regulations are observed:

DOD 4145.9-R-1 para 6114 (a), 6-115, 6-114:

Task Error	Frequency
Proper lifting/improper simple action	21
Loading/improper attention	6
Proper lifting/misjudge speed/size/distance	5
Loading/failed to anticipate	5
	37 Total entries
	8.5% of total

Common Safety Practices

Task Error	Frequency
Improper attention	8
Vehicles: misjudged speed/size/distance	5
Human: misjudged speed/size/distance	5
Improper decision: slipped/tripped/fell	5
Improper complex physical action: slipped/tripped/fell	5

Material handling: improper decision	5
Violated orders/CSP: improper decision	5
Vehicles: improper complex physical action	5
	43 Total entries
	7.6% of total

FM 21-305 p. 7-7 para 2:

Task Error (Speeding)	Frequency
Improper decision	9
Improper attention	7
Misjudged speed/size/distance	5
Failed to comply with general rules	5
	26 Total entries
	4.6% of total

In comparison with the previous sections the FM 57-220 p. 2-6 group has "disappeared," that is, it has been split into smaller classes. Furthermore, the distribution of cell populations is much less concentrated in a few cells as evidenced by the distribution of most significant paired factors in this situation. There is a down-trend in all groups, partially because the distribution was truncated when cell populations fell below 5. The usual other clusterings persist.

Also included in this section are the following:

1. A matrix of REGULATION x CAUSE FACTOR pairings (Table 5).
2. A distribution of the most frequently occurring paired factors (Table 6).

TABLE 5

Accident frequency listed by Manual and Cause Factor

	INSPECTED/SEARCH	ATTENTION	RECOGNITION	SPEED/SIZE/DIST	MISINTERPRET	ANTICIPATION	PLANNING	DECISION	TROUBLE SHOOT/PROB SOLVE	FOLLOWING ORDERS/LAWS	COMPLIANCE GEN. RULES	PHYS. ACT.(SIMPLE)	PHYS. ACT.(COMPLEX)	COMMUNICATION	INSUFF. INFO.	TOTAL	
1.	0	7	3	5	0	4	0	9	0	3	5	2	3	0	0	41	SPEEDING
2.	0	0	0	1	0	1	0	2	0	2	2	1	0	0	0	9	FASTEN SEAT BELTS
3.	0	2	2	1	0	1	0	2	0	2	0	0	1	0	0	11	FOLLOWING DISTANCE
4.	0	4	0	0	0	2	0	1	0	0	0	1	0	0	0	8	RESTING
5.	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	PASSENGERS SEATED
6.	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	STARTING PROCEDURES
7.	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	4	SAFE OP., ATTITUDE
8.	0	4	0	0	0	3	0	1	0	1	0	1	0	0	0	10	DRIVING IN RAIN
9.	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	ALCOHOL USE
10.	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	3	ALCOHOL USE
11.	0	4	0	1	0	0	1	1	0	0	0	0	0	0	0	7	TRY TO ANTICIPATE
12.	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	3	BEING A PEDESTRIAN
13.	0	0	1	2	0	1	0	0	0	2	0	0	0	0	0	6	SAFE AND UNSAFE PASSING
14.	0	1	0	2	0	1	0	0	0	0	2	0	0	0	0	6	HANDLING CURVES
15.	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	4	AUTHORIZATION
16.	0	0	0	0	0	1	0	3	0	2	0	0	0	0	0	6	IDENTIFICATION CARD
17.	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	3	FATIGUE
18.	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2	TURN OFF ENGINE
19.	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3	DRIVING ON THE RIGHT
20.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	HANDLING CARGO
21.	0	5	2	0	0	0	0	1	0	2	1	0	1	0	0	12	SELECTIVE VISION
22.	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	PARKING AT NIGHT
23.	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	4	USE A TOW BAR
24.	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	4	OP. IN BLACKOUT COND.
25.	0	0	0	0	0	0	0	2	0	1	1	0	1	0	0	5	GROUND GUIDES
26.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	PEDESTRIANS
27.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	BLOWOUTS
28.	1	0	1	1	0	0	0	1	0	1	2	0	0	0	0	7	INSPECTIONS
29.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	LIGHTS
30.	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	4	AVOIDING COLLISIONS
31.	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	3	DRIVER PRAC/HAND POSITION
32.	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	U-TURNS
33.	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	BRAKING AND STOPPING
34.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	PREVENTIVE MAINT.
35.	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	3	NIGHT DRIVING, RED. VISION

	INSPECTED/SEARCH	ATTENTION	RECOGNITION	SPEED/SIZE/DIST	MISINTERPRET	ANTICIPATION	PLANNING	DECISION	TROUBLE SHOOT/PROB SOLVE	FOLLOWING ORDERS/LAWS	COMPLIANCE GEN. RULES	PHYS. ACT.(SIMPLE)	PHYS. ACT.(COMPLEX)	COMMUNICATION	INSUFF. INFO.	TOTAL	
36.	0	2	3	0	0	1	0	1	0	1	0	0	0	0	0	8	ANT. & WATCH PEDESTRIANS
37.	0	0	1	0	0	0	0	1	0	0	0	1	2	0	0	5	RUNNING OFF PAVEMENT
38.	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2	ANIMALS
39.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	LOWER YOUR BEAMS
40.	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	4	INTERSEC. W/TRAFFIC CONT.
41.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	DURING OP. PROCEDURE
42.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVER RESPONSIBILITIES
43.	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	3	STARTING/CHECK THE GEARS
44.	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	3	BACKING
45.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	SAFE SPEEDS AT NIGHT
46.	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	3	TURN OFF ENGINE, SET BRAKE
47.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	SAFE PASSING DISTANCE
48.	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	4	INTERSEC. w/o TRAFFIC CON.
49.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURNING ON WET ROAD
50.	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	SIGNALING
51.	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	BEING PASSED
52.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	OVERHEAD VEHICLE CLEARANCE
53.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	OP. SPECIAL PURPOSE VEH.
54.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	QUALIFICATION RECORD
55.	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	4	CHECK TRAFFIC CONDITIONS
56.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	PASSENGER LIMIT
57.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	JACKNIFING
58.	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	SECONDARY ROADS
59.	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	3	COUP. TRACTOR & SEMI
60.	0	0	0	2	0	1	0	0	0	0	1	1	0	0	0	5	SNOW AND ICE
61.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	ROAD CONFIGURATION
62.	0	1	0	0	0	0	0	2	0	0	0	0	0	1	0	4	BEFORE TURN/CHANGE LANES, LOOK
63.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	IMPROPER BACKING
64.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	LOOK BEFORE CHANGING LANES
65.	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	TRAFFIC LINES
66.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	SHIFITING GEARS
67.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	TURNING
68.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	TRAFFIC SIGNALS
69.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	INTERSEC. W/TRAFFIC CONTROLS
70.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	FOG

	INSPECTED/SEARCH	ATTENTION	RECOGNITION	SPEED/SIZE/DIST	MISINTERPRET	ANTICIPATION	PLANNING	DECISION	TROUBLE SHOOT/PROB SOLVE	FOLLOWING ORDERS/LAWS	COMPLIANCE GEN. RULES	PHYS. ACT.(SIMPLE)	PHYS. ACT.(COMPLEX)	COMMUNICATION	INSUFF. INFO.	TOTAL	
71.	1	0	1	0	0	1	0	2	0	3	3	0	0	0	0	11	S.O.P.
72.	0	1	2	2	0	1	0	5	0	3	2	0	1	0	0	17	CSP: VIO. ORDERS/KNOWN PRAC.
73.	0	3	4	5	0	1	0	2	0	4	1	1	5	0	0	26	CSP: VEHICLES
74.	1	8	4	5	0	2	0	5	0	2	1	1	5	0	0	34	CSP: SLIPPED, TRIPPED, FELL
75.	1	3	1	3	0	2	0	5	0	1	1	2	1	0	0	20	CSP: MATERIAL HANDLING
76.	0	0	0	1	0	0	0	1	0	0	1	0	1	0	0	4	GROUND GUIDES (FM 21-306)
77.	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	4	INTERCOM SYSTEM (FM 21-306)
78.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	USING A GUIDES (FM 21-306)
79.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	DRIVING JUDGEMENT (FM 21-306)
80.	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	3	RIDER OUT OF VEH. (FM 21-306)
81.	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	3	STRIKING A TREE (FM 21-306)
82.	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	3	BLACKOUT MARKERS (FM 21-306)
83.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	HANDLING A SHOTGUN
84.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TILE NEEDED REPAIRING
85.	0	0	0	0	0	1	0	4	0	3	0	0	0	0	0	8	VEHICLE LICENSING
86.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	LINE POSITION WHEN JUMPING
87.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	PARKING BRAKE
88.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	REFUELING M54A2 TRUCK
89.	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	LICENSE TO OP. HEAT/COOL EQU.
90.	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2	EARPLUG USE
91.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	FUEL LEAK FROM STOVE
92.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	STAIRS
93.	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2	JUMPING FROM VEH.
94.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	GEN. RULES FOR MAINT.
95.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CLEANING & HAND. RIFLE
96.	0	2	0	0	0	3	0	1	0	2	0	1	4	0	0	13	PROPER PLF
97.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	EXERCISING AUTHOR.
98.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	HANDLING DUD SIMULATORS
99.	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	HANDLING DUD SIMULATORS
100.	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	OPERATIONAL TEST BEFORE FIRING
101.	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	QUAL. FOR ASSIGNED WEAPON
102.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	PLAYING SOFTBALL
103.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	SECURE CARGO
104.	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	ANT. OTHER JUMPER
105.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	ESCORT TOO FAR IN FRONT

	INSPECTED/SEARCH	ATTENTION	RECOGNITION	SPEED/SIZE/DIST	MISINTERPRET	ANTICIPATION	PLANNING	DECISION	TROUBLE SHOOT/PROB SOLVE	FOLLOWING ORDERS/LAWS	COMPLIANCE GEN. RULES	PHYS. ACT.(SIMPLE)	PHYS. ACT.(COMPLEX)	COMMUNICATION	INSUFF. INFO.	TOTAL	
106.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVER TRAINING
107.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	TURRET POWER OFF
108.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	PLACEMENT DURING FIRING
109.	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	PROC. WHEN VEH. DEV. TROUBLE
110.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TIME SINCE LAST JUMP
111.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	INCORRECT ALT. SETTING
112.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	INCORRECT ALT. SETTING
113.	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	ELECTROCUTED B/C MISS CLEARANCE
114.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	ROCKET LEAK
115.	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	PARACHUTE MALFCT.
116.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CONVOYING (FM 21-306)
117.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRY FLOORS
118.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVING AT NIGHT (FM 21-306)
119.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	HEAT STROKE
110.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	PRECAUTIONS REG. HEAT
121.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	VARIED TERRAIN (FM 21-306)
122.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	LANDING WHEEL LOCKED IN PLACE
123.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ADV. DRIVER TR. (FM 21-306)
124.	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	PROPER LIFTING
125.	0	3	3	5	0	2	0	4	0	2	3	21	1	0	0	44	NON-POWERED MAT. HANDLING
126.	0	1	0	3	0	1	0	2	0	0	1	1	0	0	1	10	LOADING
127.	0	6	1	1	0	5	0	1	0	0	2	2	1	0	0	19	LADDERS
128.	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	3	GOOD HOUSEKEEPING
129.	1	0	2	0	0	0	0	0	0	1	0	1	0	0	0	5	POWERED MAT. HANDLING
130.	1	1	0	0	0	2	0	0	0	0	0	1	0	1	0	6	STAIRWAYS
131.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	COMBAT DRIVING (FM21-306)
132.	0	0	0	0	0	3	0	3	0	2	1	1	0	1	0	11	FORKLIFT SAFETY RULES
133.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	FLAMMABLE MAT. STORAGE
134.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	ACCLIMATIZATION
135.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	WATER DURING EXERCISE
136.	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	4	SAFE LOCATION OF PERSONS
137.	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	4	RIGGING B/TW VEH.
138.	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	4	TOWING WHEELED VEH.
	15	80	50	60	1	59	2	104	0	64	40	47	40	6	1	569	TOTAL

TABLE 6

DISTRIBUTION OF THE MOST SIGNIFICANT PAIRED FACTORS

FACTORS: REGULATION	X CAUSE FACTOR	FREQUENCY
DOD 4145.9-R-1 para 6-114 (a)	Proper lifting, improper simple physical action	21
FM 21-305 p. 7-7 para 2	Speeding, improper decision	9
Common Safety Practice	slipped/tripped/fell, improper attention	8
FM 21-305 p. 7-7 para 2	Speeding, improper attention	7
DOD 4145, 9-R-1, para 6-115	Loading, improper attention	6
FM 21-305 p. 7-7 para 2	Speeding, misjudged speed/size/distance	5
FM 21-305 p. 7-7 para 2	Speeding, failed to comply with general rules	5
Common Safety Practice	vehicles, misjudged speed/size/distance	5
Common Safety Practice	slipped/tripped/fell, misjudged speed/size/distance	5
Common Safety Practice	violated orders/known safety practices, improper decision	5
Common Safety Practice	slipped/tripped/fell, improper decision	5
Common Safety Practice	slipped/tripped/fell, improper complex physical action	5
Common Safety Practice	material handling, improper decision	5
Common Safety Practice	vehicles, improper complex physical action	5
DOD 4145.9-R-1 para 6-114 (a)	Proper lifting, misjudged speed/size/distance	5
DOD 4145.9-R-1 para 6-115	Loading, failed to anticipate	5
	TOTAL:	106
	TOTAL OCCURENCES:	569
	% TOTAL:	18.6%
	AVERAGE POPULATION PER CELL:	.27

REGULATIONS x SYSTEM INADEQUACY

Results and Discussion

Introductory comments from the preceding sections are applicable to this section, except that we are dealing with Regulations Violated (138 factors) and System Inadequacies (25 factors). The matrix displaying this informations will therefore have 138 rows (representing the Regulation violated) and 25 columns (representing the System Inadequacy), plus marginal totals for rows, columns, and a grand total.

The most significant paired-factors section is shorter than previous sections due to the truncation condition (that cells corresponding to significant paired factors should contain at least 5 elements).

The usual groupings still remain:

DOD 4145.9-R-1 para 6-114 (a):

System Inadequacy (Proper lifting)	Frequency
Insufficient information	10
Overconfidence	7
Inadequate motivation	6 Total entries
	4.8% of total

Common Safety Practices:

System Inadequacy	Frequency
Slipped/tripped/fell: inadequate attention	8
Vehicles: inadequate attention	7
Slipped/tripped/fell: insufficient information	6
	21 Total

entries

4.4% of total

FM 21-305 p. 7-7 para 2:

System Inadequacy (Speeding)	Frequency
Overconfidence	6
Insufficient information	6
	10 Total entries
	2% of total

Also included in this section are the following:

1. A matrix of REGULATION x SYSTEM INADEQUACY pairings (Table 7).

2. A distribution of the most frequently occurring paired factors (Table 8).

TABLE 7

Accident frequency listed by Manual and System Inadequacy

	SCHOOL TRAINING	UNIT TRAINING	EXPERIENCE	COMPOSURE	ATTENTION	OVERCONFIDENCE	LACK CONFID.	MOTIVATION	FATIGUE	ALC/DRUGS	HABIT INT.	INTER.	FAC/SERVICE	EQUIP DESIGN	MANUF./ASSEMBLE	MAINTENANCE	USE TOOL/EQ/MST	PROC./NORMAL CON.	PROC./ABN. CON.	HIGHC. ISUP	UNI. C. ISUP	UL/NCO/ISUP	CF	INS. INF.	NOT APPLIC.	TOTAL	
1.	0	1	3	1	2	5	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	21	SPEEDING
2.	0	0	2	0	0	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	FASTEN SEAT BELTS
3.	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	FOLLOWING DISTANCE
4.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	RESTING
5.	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	PASSENGERS SEATED
6.	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	STARTING PROCEDURES
7.	0	0	1	0	0	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	SAFE OP., ATTITUDE
8.	0	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	1	10	DRIVING IN RAIN
9.	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	ALCOHOL USE
10.	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	ALCOHOL USE
11.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	5	TRY TO ANTICIPATE
12.	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	BEING A PEDESTRIAN
13.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	SAFE AND UNSAFE PASSING
14.	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	HANDLING CURVES
15.	0	1	2	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	AUTHORIZATION
16.	0	1	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	IDENTIFICATION CARD
17.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	FATIGUE
18.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	TURN OFF ENGINE
19.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	DRIVING ON THE RIGHT
20.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	HANDLING CARGO
21.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	SELECTIVE VISION
22.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PARKING AT NIGHT
23.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	USE A TOW BAR
24.	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	OP. IN BLACKOUT COND.
25.	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	GROUND GUIDES
26.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PEDESTRIANS
27.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	BLOWOUTS
28.	0	1	0	0	1	2	0	2	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	9	INSPECTIONS
29.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	LIGHTS
30.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AVOIDING COLLISIONS
31.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	DRIVER PRAC./HAND POSITION
32.	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	U-TURNS
33.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	BRAKING AND STOPPING
34.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PREVENTIVE MAINT.
35.	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	3	NIGHT DRIVING, RED. VISION

	SCHOOL TRAINING	UNIT TRAINING	EXPERIENCE	COMPOSURE	ATTENTION	OVERCONFIDENCE	LACK CONFID.	MOTIVATION	FATIGUE	ALC/DRUGS	HABIT INT.	INTER.	FAC/SERVICE	EQUIP DESIGN	MANUF./ASSEMBLE	MAINTENANCE	USE TOOL/EQ/MST	PROC./NORMAL CON.	PROC./ABN. CON.	HIGHC. ISUP	UNI. C. ISUP	UL/NCO/ISUP	CF	INS. INF.	NOT APPLIC.	TOTAL	
36.	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	4	ANT. & WATCH PEDESTRIANS
37.	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	4	RUNNING OFF PAVEMENT
38.	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	ANIMALS
39.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	LOWER YOUR BEAMS
40.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	INTERSEC. W/TRAFFIC CONT.
41.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	DURING OP. PROCEDURE
42.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	DRIVER RESPONSIBILITIES
43.	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	STARTING/CHECK THE GEARS
44.	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	BACKING
45.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SAFE SPEEDS AT NIGHT
46.	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	TURN OFF ENGINE, SET BRAKE
47.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SAFE PASSING DISTANCE
48.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	INTERSEC. w/o TRAFFIC CON.
49.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURNING ON WET ROAD
50.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	SIGNALING
51.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	BEING PASSED
52.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	OVERHEAD VEHICLE CLEARANCE
53.	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	OP. SPECIAL PURPOSE VEH.
54.	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	QUALIFICATION RECORD
55.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CHECK TRAFFIC CONDITIONS
56.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PASSENGER LIMIT
57.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	JACKNIFING
58.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	SECONDARY ROADS
59.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	COUP. TRACTOR & SEMI
60.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	SNOW AND ICE
61.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	ROAD CONFIGURATION
62.	0	0	1	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	7	BEFORE TURN/CHANGE LANES, LOOK
63.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IMPROPER BACKING
64.	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	LOOK BEFORE CHANGING LANES
65.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TRAFFIC LINES
66.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	SHIFITING GEARS
67.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TURNING
68.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	TRAFFIC SIGNALS
69.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	INTERSEC. W/TRAFFIC CONTROLS
70.	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	FOG

	SCHOOL TRAINING	UNIT TRAINING	EXPERIENCE	COMPOSURE	ATTENTION	OVERCONFIDENCE	LACK CONFID.	MOTIVATION	FATIGUE	ALC/DRUGS	HABIT INT.	INTER.	FAC/SERVICE	EQUIP DESIGN	MANUF./ASSEMBLE	MAINTENANCE	USE TOOL/EQ/MST	PROC./NORMAL CON.	PROC./ABN. CON.	HIGHC. ISUP	UNI. C. ISUP	UL/NCO/ISUP	CF	INS. INF.	NOT APPLIC.	TOTAL	
71.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	4	S.O.P.
72.	0	0	0	0	1	1	0	3	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	9	CSP: VIO. ORDERS/KNOWN PRAC.
73.	0	0	1	0	7	4	0	1	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	3	0	20	CSP: VEHICLES
74.	0	0	0	0	8	3	0	2	2	0	0	4	0	1	1	1	0	1	0	0	0	0	0	6	0	29	CSP: SLIPPED, TRIPPED, FELL
75.	0	1	1	1	4	1	0	1	1	0	2	0	0	0	0	1	0	0	1	0	0	1	1	4	0	20	CSP: MATERIAL HANDLING
76.	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	5	GROUND GUIDES (FM 21-306)
77.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	INTERCOM SYSTEM (FM 21-306)
78.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	USING A GUIDES (FM 21-306)
79.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	DRIVING JUDGEMENT (FM 21-306)
80.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	RIDER OUT OF VEH. (FM 21-306)
81.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	STRIKING A TREE (FM 21-306)
82.	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	BLACKOUT MARKERS (FM 21-306)
83.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	HANDLING A SHOTGUN
84.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	TILE NEEDED REPAIRING
85.	0	1	1	0	1	4	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	10	VEHICLE LICENSING
86.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	LINE POSITION WHEN JUMPING
87.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	PARKING BRAKE
88.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	REFUELING M54A2 TRUCK
89.	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	4	LICENSE TO OP. HEAT/COOL EQU.
90.	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	EARPLUG USE
91.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	FUEL LEAK FROM STOVE
92.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	STAIRS
93.	0	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	JUMPING FROM VEH.
94.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	GEN. RULES FOR MAINT.
95.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	CLEANING & HAND. RIFLE
96.	0	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	5	PROPER PLF
97.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	EXERCISING AUTHOR.
98.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	HANDLING DUD SIMULATORS
99.	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	HANDLING DUD SIMULATORS
100.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OPERATIONAL TEST BEFORE FIRING
101.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	QUAL. FOR ASSIGNED WEAPON
102.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PLAYING SOFTBALL
103.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	SECURE CARGO
104.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ANT. OTHER JUMPER
105.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ESCORT TOO FAR IN FRONT

	SCHOOL TRAINING	UNIT TRAINING	EXPERIENCE	COMPOSURE	ATTENTION	OVERCONFIDENCE	LACK CONFID.	MOTIVATION	FATIGUE	ALC/DRUGS	HABIT INT.	INTER.	FAC/SERVICE	EQUIP DESIGN	MANUF./ASSEMBLE	MAINTENANCE	USE TOOL/EQ/MST	PROC./NORMAL CON.	PROC./ABN. CON.	HIGHC. ISUP	UNI. C. ISUP	UL/NCO/ISUP	CF	INS. INF.	NOT APPLIC.	TOTAL	
106.	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	DRIVER TRAINING
107.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	TURRET POWER OFF
108.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PLACEMENT DURING FIRING
109.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PROC. WHEN VEH. DEV. TROUBLE
110.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	TIME SINCE LAST JUMP
111.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	INCORRECT ALT. SETTING
112.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	INCORRECT ALT. SETTING
113.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ELECTROCUTED B/C MISS CLEARANCE
114.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	ROCKET LEAK
115.	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	4	PARACHUTE MALFCT.
116.	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	CONVOYING (FM 21-306)
117.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	DRY FLOORS
118.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	DRIVING AT NIGHT (FM 21-306)
119.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	HEAT STROKE
120.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PRECAUTIONS REG. HEAT
121.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	VARIED TERRAIN (FM 21-306)
122.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	LANDING WHEEL LOCKED IN PLACE
123.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ADV. DRIVER TR. (FM 21-306)
124.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	PROPER LIFTING
125.	0	0	1	0	0	7	0	6	0	0	1	0	2	0	0	1	1	2	0	0	0	0	1	10	0	32	NON-POWERED MAT. HANDLING
126.	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	0	8	LOADING
127.	0	0	1	0	4	2	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	4	0	16	LADDERS
128.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	GOOD HOUSEKEEPING
129.	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5	POWERED MAT. HANDLING
130.	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	6	STAIRWAYS
131.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	COMBAT DRIVING (FM21-306)
132.	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	3	0	6	FORKLIFT SAFETY RULES
133.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	FLAMMABLE MAT. STORAGE
134.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	ACCLIMATIZATION
135.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	WATER DURING EXERCISE
136.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	SAFE LOCATION OF PERSONS
137.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	RIGGING B/TW VEH.
138.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	TOWING WHEELED VEH.
	1	20	36	5	52	71	5	41	11	1	12	18	8	7	1	9	4	12	3	0	2	2	27	71	6	425	TOTAL

DISTRIBUTIONS OF THE MOST SIGNIFICANT PAIRED FACTORS

FACTORS: REGULATION X SYSTEM INADEQUACY	FREQUENCY
DOD 4145, 9-R-1, para 6-114 (a): Proper Lifting, insufficient information	10
CSP: slipped/tripped/fell, inadequate attention	8
CSP: vehicles, inadequate attention	7
DOD 4145, 9-R-1, para 6-114 (a): Proper lifting, overconfident	7
CSP: slipped/tripped/fell, insufficient information	6
DOD 4145, 9-R-1, para 6-114 (a): Proper lifting, inadequate motivation	6
FM 21-305, p. 7-7 para 2: Speeding, overconfident	5
FM 21-305 p. 7-7 para #2: Speeding, insufficient information	5
TOTAL:	54
TOTAL OCCURENCES	483
% TOTAL	11.2%
AVERAGE POPULATION PER CELL:	.14

* Remark: The table was cut short because of the excessive number of draws for smaller numbers. In addition, these cells contained fewer than five individuals.

In the following section several tables are provided which give information on the most frequently violated procedures without regarding other taxonomical variables or considerations. We note that in previous tables where paired factors were compared, the numbers of occurrences obtained here would appear as margins with some variations in numbers due to methods of reporting used.

The Table 9 lists the top twenty most frequently violated procedures, ranging from a frequency of 51 to a frequency of 9. Selecting the top 20 is largely an arbitrary process. With 138 violated procedures listed, the number 20 was felt to be a reasonable compromise between too many and too few.

In table 10 the violations are decomposed into three distinct groups, viz., the most frequently occuring violations, the frequently occurring violations, and the infrequently occurring violations. The frequency ranges associated with each group are (20 - 51) for group 1, (10 - 16) for group 2, and (5 - 9) for group 3. Percentagewise these groups are of roughly equal size. In terms of the specific number of violations involved groups have 6, 13, and 20 entries respectively for each of groups 1, 2, and 3.

Finally, Table 11 lists the top ten most frequently violated procedures. Compared to the top twenty with 360 occurrences, the top ten provide 252 occurrences, which suggests that if groups are selected ten at a time, then the number of occurrences per group will follow some exponential decay curve with some degree of accurracy.

As was mentioned in the general discussion above, the data included allow for the construction of a considerable variety of tables as well as for the extraction of a variety of conclusions from these data. The tables we have included in this section are only a sample of what is possible. On the other hand, it is expected that from this information claims made elsewhere and recommendations arrived at are fully supportable.

TABLE 9

TOP TWENTY MOST FREQUENTLY VIOLATED PROCEDURES

PROCEDURE VIOLATED	PROCEDURE SUBJECT	FREQUENCY
1. FM 21-305, para 7-7	Controlling Speed	51
2. DOD 4145, 9-R-1, para 6-114	Proper Lifting Method	38
3. Common Safety Practices	Human Locomotion	31
4. Common Safety Practices	In and Around Vehicles	30
5. Common Safety Practices	Material Handling	20
6. DOD 4145, 9-R-1, para 6-115	Loading/Unloading Veh	20
7. FM 21-305, para 13-3, 13-4	Driving in Rain	16
8. FM 21-305, para 8-2, 8-3	Using Selective Vision	16
9. Common Safety Practices	Orders/Known Practices	16
10. FM 21-305, para 8-4	Getting Adequate Rest	14
11. FM 21-305, para 2-2	Before, During, & After Operation Inspections	13
12. FM 21-305, para 9-1	Safe Following Distances	12
13. FM 21-305, para 9-2, 9-3	Passing Maneuvers	12
14. FM 21-305, para 11-1	Intersections Without Traffic lights	11
15. DOD 4145, 9-R-1, para 6-112 (c)	Fork Lift Safety Rules	11
16. FM 21-305, para 6-2	Anticipating the Actions of Other Drivers	10
17. FM 21-305, para 12-1, 12-2	Anticipate and Watch For Pedestrians	10
18. AR 600-55, para 5-1	Vehicle Licensing	10
19. FM 57-220, para 2-6	Parachute Landing Fall	10
20. FM 21-305, para 6-1	Usage of Seatbelts	9
		360

TABLE 10

Procedure violations grouped by frequency of occurence

MOST FREQUENT OCCURRENCES

Frequencies $\geq$ 20 in Rank Order

	SPECIFIC VIOLATION	LISTING	FREQUENCY
1.	Speeding	1	51
2.	Improper Lifting	128	38
3.	CSP: Slipped, Tripped, and Fell	74	31
4.	CSP: Vehicles	73	30
5.	CSP: Material Handling	75	20
6.	Loading	130	20
	TOTAL		190
	Percent Occurrence		23.03%
	Percent Cases		31.40%

FREQUENT OCCURRENCES

Frequencies 19 $\geq$ N $\geq$ 10

in Rank Order

7.	Driving in Rain	8	16
8.	Selective Vision	21	16
9.	CSP: Violated Orders/Known Practices	72	16
10.	Resting	4	14
11.	Inspections	28	13
12.	Following Distance	3	12
13.	Unsafe Passing	13	12
14.	Intersections Without Traffic Controls	48	11
15.	Forklift Safety Rules	135	11
16.	Trying to Anticipate	11	10
17.	Anticipate and Watch Pedestrians	36	10
18.	Vehicle Licensing	85	10
19.	Improper Parachute Landing/Fall	99	10
	TOTAL		161
	Percent Occurrence		19.52%
	Percent Cases		26.61%

INFREQUENT OCCURRENCES
Frequencies $9 \geq N \geq 5$
in Rank Order

20.	Fasten Seat Belt	2	9
21.	Safe Operation/Attitude	7	9
22.	Handling Curves	14	8
23.	Identification Card	16	8
24.	Fatigue	17	8
25.	Operation Under Blackout Conditions	24	8
26.	Ground Guides	25	8
27.	Night Driving, Reduced Vision	35	8
28.	Running off Pavement	37	8
29.	Before Turning/Changing Lanes, Look	62	8
30.	Ground Guides	76	8
31.	Powered Material Handling	133	8
32.	Intersections with Traffic Signs	40	7
33.	Signaling	50	7
34.	Alcohol Use	10	6
35.	Authorization	15	6
36.	Backing	44	6
37.	Snow and Ice	60	6
38.	Being Passed	51	5
39.	Good Housekeeping	132	5
	TOTAL		146
	Percent Occurrences		17.70%
	Percent Cases		24.13%

TABLE 11

List of the top ten most frequently violated procedures
TOP TEN TOTAL NUMBER OF OCCURRENCES

1.	Speeding (FM 21-305 Page 7-7).....	1	51
2.	Improper Lifting (DOD 4145.9-R-1 Page 6-114 [a]).....	128	38
3.	CSP: Slipped, Tripped, and Fell.....	74	31
4.	CSP: Vehicles.....	73	30
5.	CSP: Material Handling.....	75	20
6.	Loading (DOD 4145.9-R-1 Page 6-115).....	130	20
7.	Driving in Rain (FM 21-305 Page 13-3, 13-4).....	8	16
8.	Selective Vision (FM 21-305 Page 8-2, 8-3).....	21	16
9.	CSP: Violated Orders/Known Practices..	72	16
10.	Resting (FM-21-305 Page 8-4).....	4	16
	TOTAL.....		252
	Percent Occurrences.....		30.54%
	Percent Cases.....		41.65%

CONCLUSIONS

The investigation and analysis of the most frequently violated procedures accidents clearly demonstrated that there are certain procedures which are violated at a very high frequency. By concentrating on the elimination of the more frequently violated procedures accidents, a significant improvement in safety can be expected.

Of the 605 human error accidents (out of 882 cases reviewed) the 20 most frequently violated procedures cover 360 accident cases. Even though this represents 60 percent of the total accidents in our sample, it does not imply that the Army has provided inadequate training on key activities. Instead, the results suggest that most of the frequently violated procedures deal with activities which have to be performed frequently and under all manner of circumstances. In other words, while the absolute frequency of these accidents is high, the relative frequency may be low (low relative to the number of times the activity was engaged in).

From the point of view of the manuals themselves only four are involved in the twenty most violated procedures, i.e., FM 21-305, FM 57-220, DOD 4145, and AR 600-55; the balance involve various categories of Common Safety Practices. Because of the nature of the CPS violations, attempts to reduce them will have to be more in the nature of general safety training and the

development of good safety habits than an increase in safety training on specific vehicles/procedures. It is interesting to note that the handling of explosives does not appear in the top twenty violations. It appears that the safe and capable handling of known dangerous equipment/objects is adequately taught, whereas activities which straddle the boundary between Army and civilian activity may be underemphasized. In terms of consequences, many of these routine boundary activities are the most dangerous (as clearly shown in our analysis).

The tables provide detail about the 138 procedure violations, and classify these violations by accident type, activity type, cause factor, and system inadequacy. When manuals are rewritten or updated it will be possible to target the most relevant aspect of the regulation. For example, in the case of Speeding (FM 21-305) p. 7, para. 7, the involvement of Accident Type, Activity Type, Cause Factor, and System Inadequacy can be derived from the table thereby enabling attention to focus on the aspect of the regulation where the greatest number of problems exist.

Recommendations

1. Given the fact that the top twenty most violated procedures led to 60 percent of the accidents, a special focus on such procedures is warranted.
2. Four manuals are involved in the top twenty most violated procedures: FM 21-305, FM 57-220, DOD 4145, and AR 600-55. When these manuals are revised, the relevant sections (as

indicated in our tables) should be highlighted. Also, the fact that these procedures are among the top twenty most violated procedures leading to accidents should be noted in the manual.

3. Certain violated safety procedures involve Common Safety Practices, e.g., human locomotion. Attempts to reduce such accidents would involve general safety training, however, further emphasis should be given to areas listed in this report.

4. A general activity involving a several most violated procedure is vehicle operation. The upgrading of unit training on vehicle safety is recommended. Whenever possible, provide behind-the-wheel training.

5. Another major problem is in the area of materials handling. Two procedures warrant special attention:

   a. Additional unit training should be given and upgraded as to proper lifting methods.

   b. Additional unit training is warranted in the area of forklift operation and safety.

6. Improper parachute landings typically involved spreading legs and looking at the ground before landing. During training, closer supervision may be needed to insure competence before first jump.

7. Inadequate rest is another major factor in accidents. Commanders should review current SOP concerning relief from

assigned duty and adequate rest for personnel during periods of extended tactical training. It seems that the desire for realistic training leads, in certain cases, to personnel performing duties while fatigued. Higher-level commanders should review the present balance between the conflicting needs for realistic training versus safety.

8. A summary of the findings of this study should be publicized and distributed throughout the Army ground units.

APPENDIX A

Sample data sheet

CASE NUMBER		DATE OF ACCIDENT		MANUAL	
LOG NUMBER		MANUAL		SHORT CODEWORD	
SS NUMBER		MANUAL		SHORT CODEWORD	

	ACCIDENT TYPE CHECKLIST			ACTIVITY TYPE CHECKLIST			TASK ERROR: CAUSE FACTOR CHECKLIST			TASK ERROR:SYSTEM INADEQUACY CHECKLIST		
A	PERSONAL INJURY		01	OPERATING VEH/VES/AN		T01	INADEQUATE INS/SEA		01	INADEQUATE SCHOOL TRG.	
B	ARMY MOTOR VEHICLE		02	MAINT/REPAIR/ /SERV		T02	IMPROPER ATTENTION		02	INADEQUATE UNIT TRAINING	
C	ARMY COMBAT VEHICLE		03	HANDLING MAT./PASS		T03	FAILED TO RECOGNIZE		03	INADEQUATE EXPERIENCE	
D	OTHER ARMY VEHICLE		04	HUMAN LOCOMOTION		T04	MISJUDGED SPEED/SIZE/DIST		04	INADEQUATE COMPOSURE	
E	PRIVETLY ARMED VEHICLE		05	COMBAT SOLDIERING		T05	MISINTERPRETED		05	INADEQUATE ATTENTION	
F	EXPLOSIVES		06	BEING A PASSENGER		T06	FAILED TO ANTICIPATE		06	OVERCONFIDENT	
G	FIRE		07	FOOD/DRINK PREP		T07	INADEQUATE PLANNING		07	LACK OF CONFIDENCE	
H	PROPERTY DAMAGE		08	PHYSICAL TRAINING		T08	IMPROPER DECISION		08	INADEQUATE MOTIVATION	
I	MARINE NOT UNDERWAY		09	SPORTS		T09	INADEQUATE TROUBLE SHOOTING /PROPOSAL		09	FATIGUE	
J	MARINE UNDERWAY		10	WEAPONS HAND/OP		T10	FAILED TO FOLLOW ORDER/LAWS		10	EFFECT OF ALC/DRUGS	
K	RADIATION		11	HANDLING VEHICLE/ VESSEL/ANIAML		T11	FAILED TO COMPLY WITH GEN RULES		11	HABIT INTERFERENCE	
L	TRACKED VEHICLE		12	SUPERVISORY		T12	IMPROPER SIMPLE PHYSICAL ACTION		12	ENVIRONMENTAL COMP.	
			13	TANITORIAL/HOUSE GROUND KEEPING		T13	IMPROPER CMPLX PHYSICAL ACTIONS		13	INADEQUATE FAC. SERVICE	
	COST		14	SOLDIERING		T14	INADEQUATE COMMUNICATION		14	EQUIP IMPROP DESIGNED	
	a		15	ENGING/CONST		T97	INSUFF INFO		15	INADEQUATE MAN/ASSEMBLY	
	b		16	OFFICE					16	INADEQUATE MAINTENANCE	
	INFO		17	SECURITY/LAW INF		U1			17	IMPROPER USE OF TOOL/EQ/MAT	
	a		18	PATIENT CARE		U2			18	INADEQUATE WRITTEN PROC	
	b		19	PERSONAL HYGIENE FOOD & DRK/SLPNG		U3			19	INADEQUATE WRITTEN PROC	
	INFO2		20	HORSEPLAY		U4					
	a		21	FABRICATION		U5					
	b		22	COMMUNICATION		U6					
	INFO3		23	FIRE DEPARTMENT		U7			U15		
	a		24	BISTANDING/ SPECTATING		U8			U16		
	b		25	LAUNDRY/ DRYCLEANING		U9			U15		
	INFO4		26	EDUCATIONAL		U10			U16		
	a		27	TEST/STUDY/ EXPERIMENT		U11			U17		
	b		28	INFORMATION & ARTS		U12			U18		
	INFO6		29	HOBBIES		U13			U19		
	a		30	PEST/PLANT CONTROL		U14			U20		
	b		31	CONSELING/ ADVISORY							

A	B	C	D	E	F	G	H	I	J	K	L	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	U1		
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	T01	T02	T03	T04	T05	T06	T97	T08	T09	T10	T11	U8		
T12	T13	T14	T15	T16	T17	01	02	03	04	05	06	07	08																
09	10	11	12	13	14	15	16	17	18	19	20	U5	U6																
U7	U8	U9	U10	U11	U12	U13	U14	U15	U16	U17	U18	U19	U20																

APPENDIX B

Listing of 138 violated procedures including Manual name, page, paragraph, and violation description

LISTING	MANUAL	PAGE/PARAGRAPH	SPECIFIC VIOLALTION
1.	FM 21-305	7-7	SPEEDING
2.	FM 21-305	6-1	FASTEN SEAT BELTS
3.	FM 21-305	9-1	FOLLOWING DISTANCE
4.	FM 21-305	8-4	RESTING
5.	FM-21-305	16-3	TAILGAIT, SAFETY STRAP ARE IN PLACE; ALL PASSENGERS ARE SEATED
6.	FM 21-305	3-1	STARTING PROCEDURES
7.	FM 21-305	1-3	SAFE OPERATION, ATTITUDE
8.	FM 21-305	13-3,13-4	DRIVING IN RAIN
9.	FM 21-305	13-5	ALCOHOL USE
10.	FM 21-305	8-3,8-4	ALCOHOL USE
11.	FM 21-305	6-2, PARA 2	TRY TO ANTICIPATE
12.	FM 21-305	12-2 PARA 13, 12-2 PARA 11	BEING A PEDESTRIAN
13.	FM 21-305	9-2,9-3	SAFE AND UNSAFE PASSING
14.	FM 21-305	8-2, PARA 8-14, PARA 7	HANDLING CURVES
15.	FM 21-305	1-2	AUTHORIZATION
16.	FM 21-305	1-1	IDENTIFICATION CARD
17.	FM 21-305	13-2	FATIGUE
18.	FM 21-305	1-3	TURN OFF ENGINE
19.	FM 21-305	8-1	DRIVING ON THE RIGHT
20.	FM 21-305	5-12	HANDLING CARGO
21.	FM 21-305	8-2, 8-3	SELECTIVE VISION
22.	FM 21-305	13-2	PARKING AT NIGHT
23.	FM 21-305	21-2	USE A TOW BAR
24.	FM 21-305	20-10,20-11	OPERATION UNDER BLACKOUT CONDITIONS
25.	FM 21-305	6-3	GROUND GUIDES
26.	FM 21-305	12-1,12-2	PEDESTRIANS
27.	FM 21-305	14-1	BLOWOUTS
28.	FM 21-305	2-2	INSPECTIONS
29.	FM 21-305	13-3	LIGHTS
30.	FM 21-305	7-6	AVOIDING COLLISIONS
31.	FM 21-305	6-1	DRIVING PRACTICES, HAND POSITION
32.	FM 21-305	6-4	U-TURNS
33.	FM 21-305	6-3	BRAKING AND STOPPING
34.	FM 21-305	2-1	PREVENTIVE MAINTENENCE
35.	FM 21-305	13-1	NIGHT DRIVING, REDUCED VISION
36.	FM 21-305	12-1,12-2	ANTICIPATE AND WATCH PEDESTRIANS
37.	FM 21-305	14-2	RUNNING OFF PAVEMENT
38.	FM 21-305	12-3	ANIMALS
39.	FM 21-305	13-3,PARA 6	LOWER YOUR BEAMS
40.	FM 21-305	11-2	INTERSECTIONS WITH TRAFFIC SIGNS
41.	FM 21-305	3-5	DURING OPERATION PROCEDURE
42.	FM 21-305	1-3,PARA 7-14	DRIVER RESPONSIBILITIES
43.	FM 21-305	3-1	STARTING/CHECK THE GEAR

44.	FM 21-305	6-3,6-4	BACKING
45.	FM 21-305	13-3, PARA 2	SAFE SPEEDS AT NIGHT
46.	FM 21-305	6-7, PARA 1	TURN OFF ENGINE, SET BRAKE
47.	FM 21-305	9-2	SAFE PASSING DISTANCE
48.	FM 21-305	11-1	INTERSECTIONS WITHOUT TRAFFIC CONTROLS
49.	FM 21-305	13-4, PARA 2	TURNING ON WET ROAD
50.	FM 21-305	9-4	SIGNALING
51.	FM 21-305	9-4	BEING PASSED
52.	FM 21-305	5-12	OVERHEAD VEHICLE CLEARANCE
53.	FM 21-305	5-13	OPERATING SPECIAL PURPOSE VEHICLES
54.	FM 21-305	1-2	QUALIFICATION RECORD
55.	FM 21-305	6-2, PARA 2	CHECK TRAFFIC CONDITIONS
56.	FM 21-305	16-3	PASSENGER LIMIT
57.	FM 21-305	5-3	JACKNIFING
58.	FM 21-305	13-5	SECONDARY ROADS
59.	FM 21-305	5-5, PARA 2,3	COUPLING TRACTOR AND SEMITRAILER
60.	FM 21-305	13-4	SNOW AND ICE
61.	FM 21-305	7-1	ROAD CONFIGURATION
62.	FM 21-305	11-3 PARA 2	BEFORE TURNING/ CHANGING LANES, LOOK
63.	FM 21-305	6-4	IMPROPER BACKING
64.	FM 21-305	6-3, PARA 2	LOOK BEFORE CHANGING LANES
65.	FM 21-305	10-5	TRAFFIC LINES
66.	FM 21-305	4-2	SHIFTING GEARS
67.	FM 21-305	5-6	TURNING
68.	FM 21-305	10-3	TRAFFIC SIGNALS
69.	FM 21-305	11-1,11-2	INTERSECTIONS WITH TRAFFIC CONTROLS
70.	FM 21-305	13-4	FOG
71.			STANDARD OPERATING PROCEDURE
72.			CSP: VIOLATED ORDERS/ KNOWN SAFETY PRACTICES
73.			CSP: VEHICLES
74.			CSP: SLIPPED, TRIPPED, AND FELL
75.			CSP: MATERIAL HANDLING
76.	FM 21-306	19,PARA 3,4	GROUND GUIDES
77.	FM 21-306	22,PARA 5	INTERCOMMUNICATION SYSTEM
78.	FM 21-306	20,PARA 1	WHEN USING A GUIDE
79.	FM 21-306	36,PARA 3	GOOD DRIVING JUDGEMENT
80.	FM 21-306	21,PARA 3	RIDERS ON OUTSIDE OF VEHICLE
81.	FM 21-306	21,PARA 7	WARN CREW WHEN YOU ARE GOING TO STRIKE A TREE
82.	FM 21-306	55-57	BLACKOUT MARKERS
83.	TM 9-1005-303-14		HANDLING A SHOTGUN
84.	OSHA 2206	1910.23	TILE NEEDED REPAIRING
85.	AR 600-55	5-1	VEHICLE LICENSING
86.	FM 57-220	14-3	STATIC LINE POSITION WHEN JUMPING FROM AIRCRAFT
87.	TM 9-2350-25-10-2		PARKING BRAKE
88.	TM 9-2320-211-10-3		REFUELING M54A2 TRUCK/ CONNECTING SLAVE CABLE TO BATTERY FIRST
89.	AR 600-55	6-1 a(10)	LICENSE TO OPERATE HEATING AND COOLING EQUIPMENT
90.	FM 25-7		EARPLUG USE WHEN FIRING
91.	TM 10-4500-2000-13		FUEL LEAK FROM STOVE

92.	OSHA 2206	1910.24	STAIRS
93.	AR 385-55	2-17 (c) 2	JUMPING FROM VEHICLE
94.			GENERAL RULES AND PRINCIPLES FOR MAINTANENCE
95.	TM 9-1370-203-12	2-17 (b) 2-16 (b)	CLEANING AND HANDLING OF RIFLE
96.	FM 57-220	2-6	PROPER PARACHUTE LANDING FALL
97.	AR 385-15		EXERCISING AUTHORITY
98.	TM 9-1370-203-12	2-17(b) 2-16 (b)	HANDLING DUD SIMULATORS
99.	AR 385-63		HANDLING DUD SIMULATORS
100.	FM 23-35	#17	OPERATIONAL TESTS BEFORE FIRING
101.	AR 190-14	8 (e)	QUALIFICATION FOR ASSIGNED WEAPON
102.	DA PAM 28-6		USE OF GLOVE PLAYING SOFTBALL
103.	TB 55-1520-237-20-93		TRYING TO SECURE CARGO
104.	FM 57-220	2-3	ANTICIPATE OTHER JUMPER
105.	FM 55-30	5-8	ESCORT TOO FAR IN FRONT
106.	AR 600-55	3-1 3-2	DRIVER TRAINING
107.	TM 9-2350-259-10	2-187, #15	TURRET POWER OFF
108.	TM 9-2350-311-10	2-16	PLACEMENT DURING FIRING
109.	FM 21-306	19,PARA 2	PROCEDURES WHEN VEHICLE DEVELOPS TROUBLE
110.	5th SFG REG 350-1		NOT PERFORMED JUMP IN MORE THAN ONE YEAR
111	FM 31-19		INCORRECT ALTIMETER SETTING
112.	TM 10-1670-264-13		INCORRECT ALTIMETER SETTING
113.	TB SIG 291	2,PARA D	ELECTROCUTED BECAUSE MISJUDGED CLEARANCE
114.	AR 385-102		ROCKET LEAK
115.	FM 57-220	11-1	MAIN PARACHUTE MALFUNCTION
116.	FM 21-306	17,19	CONVOYING
117.	OSHA 2206	1910.22 (a),(2)	DRY FLOORS
118.	FM 21-306	54	DRIVING AT NIGHT
119.	FM 21-306	86	COMBAT DRIVING
120.	TB MED 507	#20 (a) (b)	HEAT STROKE
121.	FM 21-20	9-1 EFFECTS	PRECAUTIONS REGARDING EXERCISE AND HEAT
122.	FM 21-306	63,64	DRIVING OVER VARIED TERRAIN
123.	TM 9-2330-202-14 & D		INSURE LANDING WHEEL IN PLACE AND LOCKED
124.	FM 21-17	24-26	ADVANCED DRIVER TRAINING
125.	DOD 4145.9-R-1	6-114 (a)	PROPER LIFTING
126.	DOD 4145.9-R-1	6-113 (a)	NON-POWERED MATERIAL HANDLING
127.	DOD 4145.9-R-1	6-115	LOADING
128.	DOD 4145.9-R-1	6-113 (e)	LADDERS
129.	DOD 4145.9-R-1	6-15 THRU 6-17, PARA 6-107	GOOD HOUSEKEEPING
130.	DOD 4145.9-R-1	6-112 (a),(7)	POWERED MATERIAL HANDLING
131.	DOD 4145.9-R-1	6-116 (a)	STAIRWAYS
132.	DOD 4145.9-R-1	6-112 (c)	FORKLIFT SAFETY RULES
133.	DOD 4145.9-R-1	6-117 (a), (2)	FLAMMABLE MATERIAL STORAGE
134.	TB MED 507	#7,#9(d)	ACCLIMATIZATION, ALTERNATE WORK AND REST PERIODS
135.	TB MED 507	#5(a)	WATER
136.	FM 20-22	#42	SAFE LOCATION OF PERSONNEL
137.	FM 20-22	#36	RIGGING BETWEEN VEHICLES
138.	FM 20-22	#56	TOWING DISABLED WHEELED VEHICLES